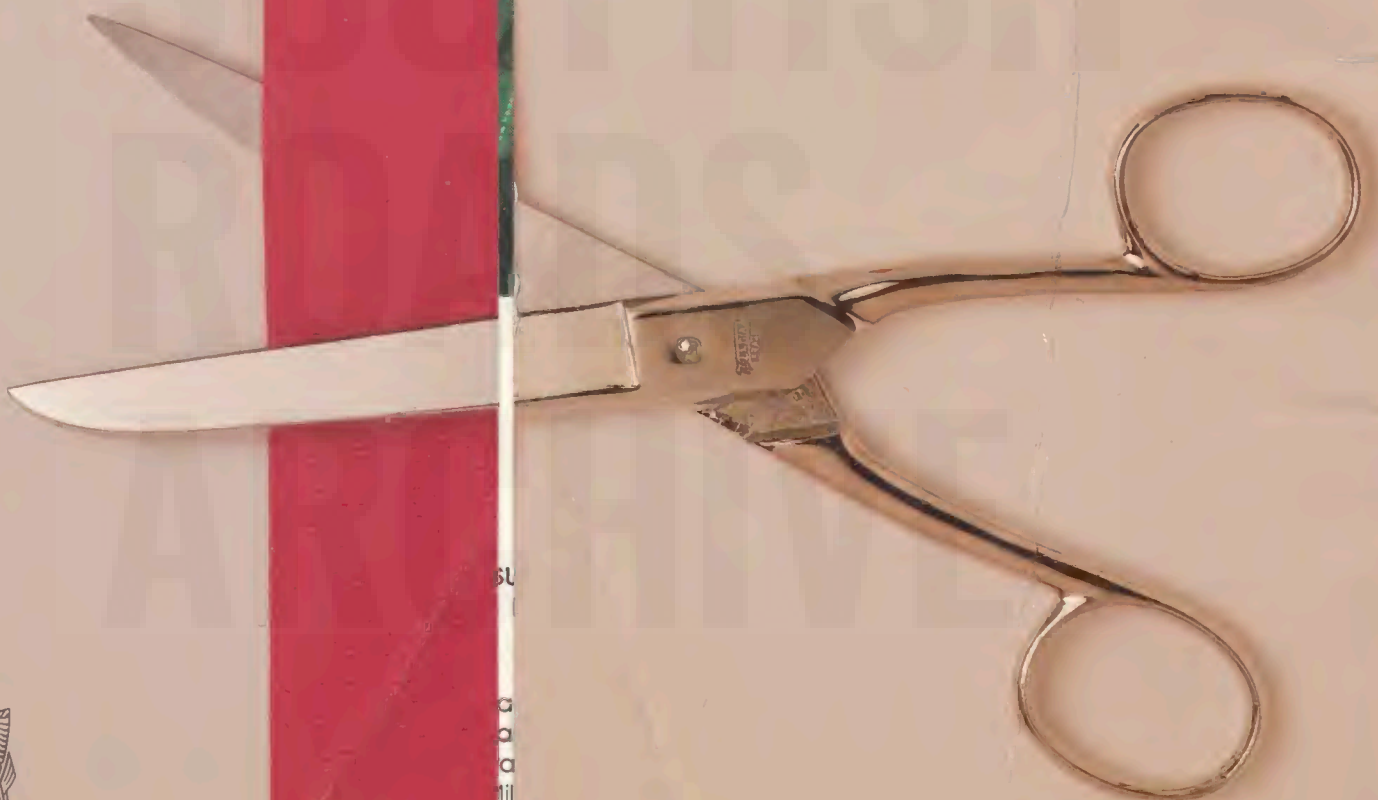


# THE EDINBURGH CITY BY-PASS OFFICIAL OPENING

19TH MARCH 1990

RT. HON. BRUCE MILLAN  
European Commissioner



Lothian Regional Council

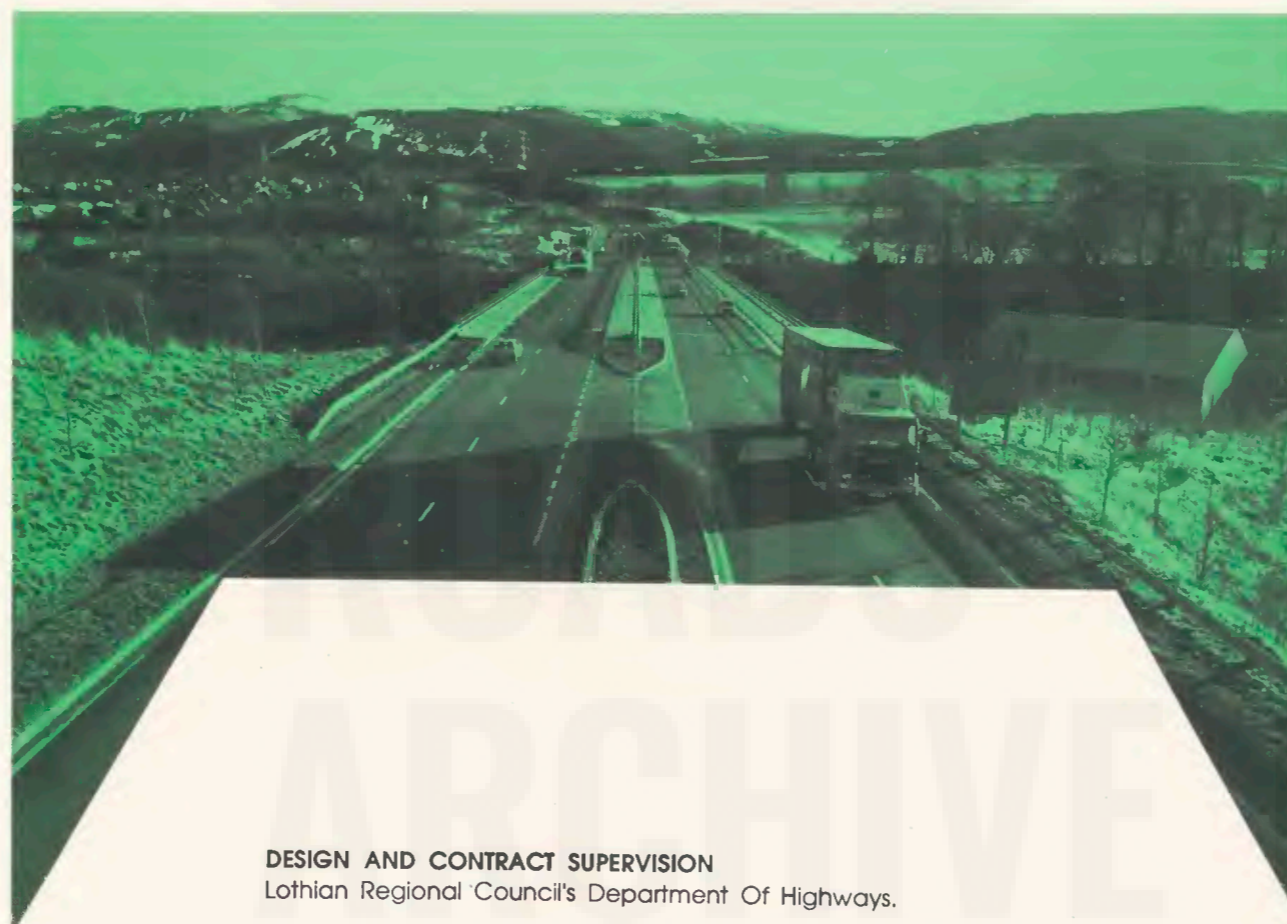


Lothian Regional Council

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# COLINTON BYPASS 1981

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**DESIGN AND CONTRACT SUPERVISION**  
Lothian Regional Council's Department Of Highways.

**MAIN CONTRACTORS**

SIGHTHILL SECTION - Balfour Beatty Construction (Scotland) Ltd.  
COLINTON SECTION - Balfour Beatty Construction (Scotland) Ltd.  
BURDIEHOUSE SECTION - Tractor Shovels Tawse Ltd.  
GILMERTON SECTION - Miller Construction Ltd.  
MILLERHILL SECTION - Tractor Shovels Tawse Ltd.



Lothian Regional Council

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# COLINTON BYPASS 1981

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## INTRODUCTION

The provision of a Bypass for Edinburgh has been a key element of Lothian Regional Council's transportation policy since the construction of the Colinton Section began in 1979.

The Bypass which is approximately 23 kms (14 miles) in length commences at the Glasgow Road (A8) immediately west of the Maybury and follows a route round the south side of the City to the Old Craighall Interchange on the Musselburgh Bypass. The entire project including the Musselburgh and Portobello Bypasses had an estimated value of £126 million, a proportion of which is being met by a Central Government Grant and a European Regional Development Fund Grant.

The Colinton Section, which was the first of five sections of the Bypass to be constructed, connects the Clovenstone Roundabout on the Wester Hailes Road with Biggar Road approximately 800 m south of the Fairmilehead crossroads, a total length of 5.5 km (3.5 miles).

Construction of the Colinton Section commenced on February 1979 and with work substantially completed by May 1981 it was opened to traffic some 3 months ahead of programme.

## DESIGN AND CONSTRUCTION

This project was designed by engineering staff in the Regional Council's Department of Highways.

The actual work of constructing the Colinton Section was undertaken by Messrs Balfour Beatty Construction (Scotland) Ltd under the terms of a contract ultimately valued at £10.0 million and supervision of this work was provided by the Department of Highways' staff with the Director of Highways being the Engineer for the Works.

This section of the Bypass is a two-lane dual carriageway 7.3 m wide. A three-lane single carriageway link has been provided between the Dreghorn Interchange and Redford Road at a new roundabout near Dreghorn Camp.

## GEOLOGY AND GROUND CONDITIONS

The route is predominantly underlain by glacial till. However compact sands and gravels were encountered at Bonaly Burn, Water of Leith, between Woodhall Bridge and the Water of Leith and near Swanston Burn. At both Swanston Burn

and Woodhall Bridge these compact sand and gravel deposits were overlain by alluvium.

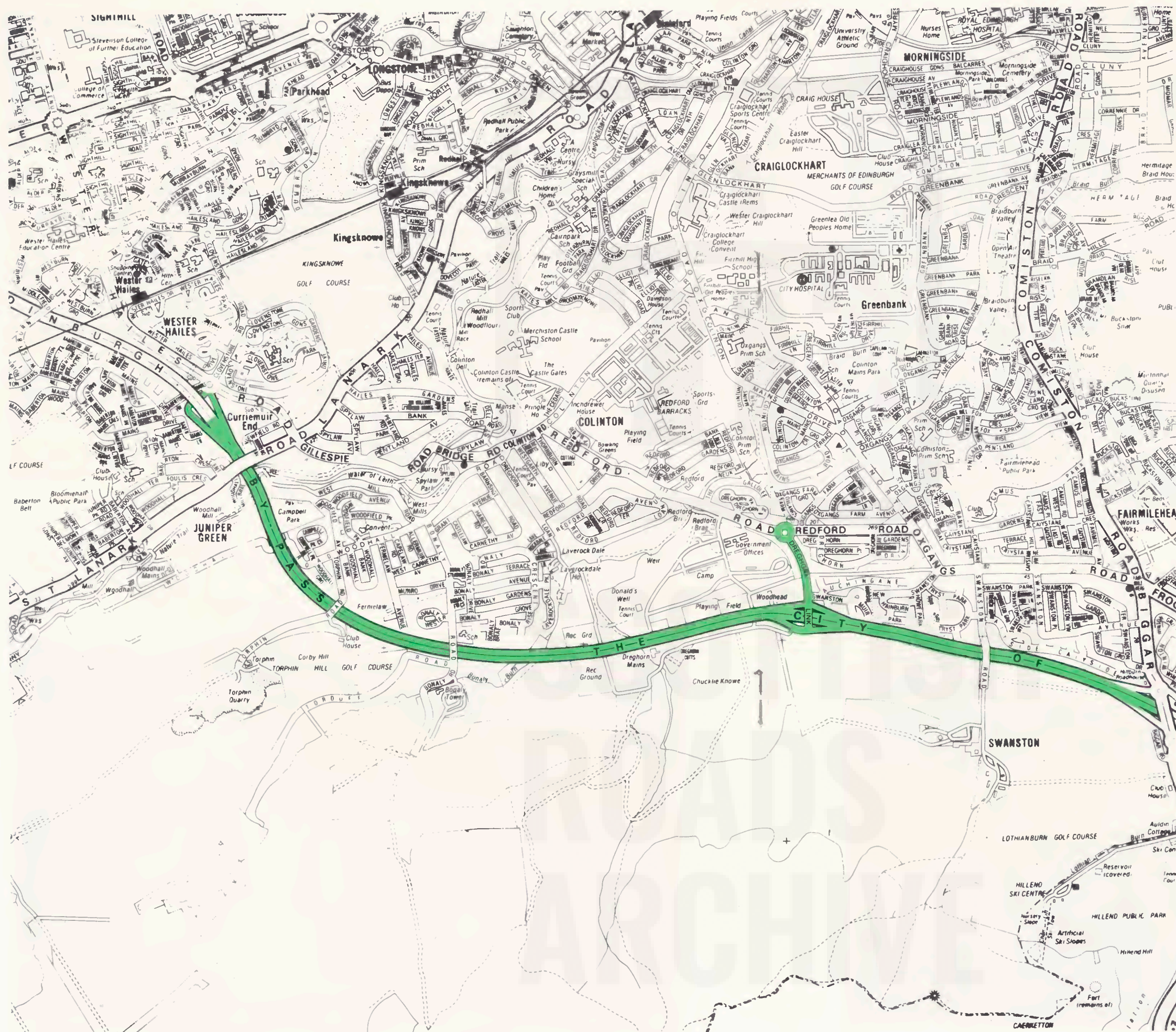
Much of the till had a weathered upper surface of soft to firm or better consistency and in general the consistency of the till improved to stiff to very stiff with increased penetration. The till comprised sandy clay containing gravel and boulders and also pockets of clayey sandy gravel.

Rockhead varied considerably throughout the route from weathered sedimentary rocks with very poor rock quality to strong lavas. The upper surface of bedrock lay close to the ground level at some areas for example at Dreghorn Footbridge and other areas such as Torphin Road were covered by some fifteen metres of overburden. At several locations the rockhead level was found to rise across the width of the Bypass.

At many locations the condition of the rockhead was found to vary and severe weathering had occurred at several places. This differential weathering had occurred not only in bands of fissile shale as was present at Lanark Road, but also in marls and in other strata susceptible to weathering.

*Lanark Road Bridge from the South*





## GENERAL ROUTE DESCRIPTION

The Colinton Section follows a south-east to easterly alignment round the south side of Colinton village from its junction with the Clovenstone Roundabout on Wester Hailes Road to a roundabout on the Biggar Road approximately 800 m south of the Fairmilehead crossroads.

The route lies predominantly within agricultural land of good quality apart from a section to the north of the Water of Leith where it is bounded by residential property.

A total of 11 structures were built enabling the Bypass to cross several major and minor roads, the Water of Leith and Bonaly Burn.

A three-lane link with Redford Road near Dreghorn Camp provides access to and from the Bypass for east- and west-bound traffic.

The Bypass intersects several access routes for walkers to the Pentland Hills and these are preserved by a footway along the link road from Redford Road and a new footpath alongside the Bonaly Burn incorporated in the Bridge at this location as well as the road crossings at Torphin, Bonaly and Swanston.



Lothian Regional Council

COLINTON BYPASS

## JUNCTIONS

### Junction with the Clovenstone Roundabout at Wester Hailes Road

Projected traffic flows indicated that a partial grade separated junction with Baberton Mains View would be adequate on completion of the Bypass but consideration had to be given to the period prior to the construction of the Sighthill Section when all of the bypassing traffic would exit onto the Wester Hailes Road via the off-slip road.

This slip road was ultimately to be connected onto Baberton Mains View but it was recognised that Baberton Mains View, which is an access into the Baberton Mains estate, would be unable to cope with the anticipated flows during this interim period. In view of this a temporary connection was constructed at the end of the slip road directly into the roundabout.

### Dreghorn Interchange

To the south-east of the Dreghorn Camp a full-grade separated interchange was provided to give both east- and west-bound traffic direct access to Redford Road via a new Spur road.

The junction now also provides access to the new housing developments to the north of the Bypass.

### Biggar Road Junction

It was recognised that the interchange at the east end of the Colinton Section would ultimately take the form of a full-grade separated junction involving the realignment of a section of Biggar Road.

For both technical and economic reasons it was decided to undertake this work as part of the Burdiehouse Section. In view of this a temporary roundabout was constructed between the Bypass and Biggar Road to the south of the Fairmilehead crossroads.

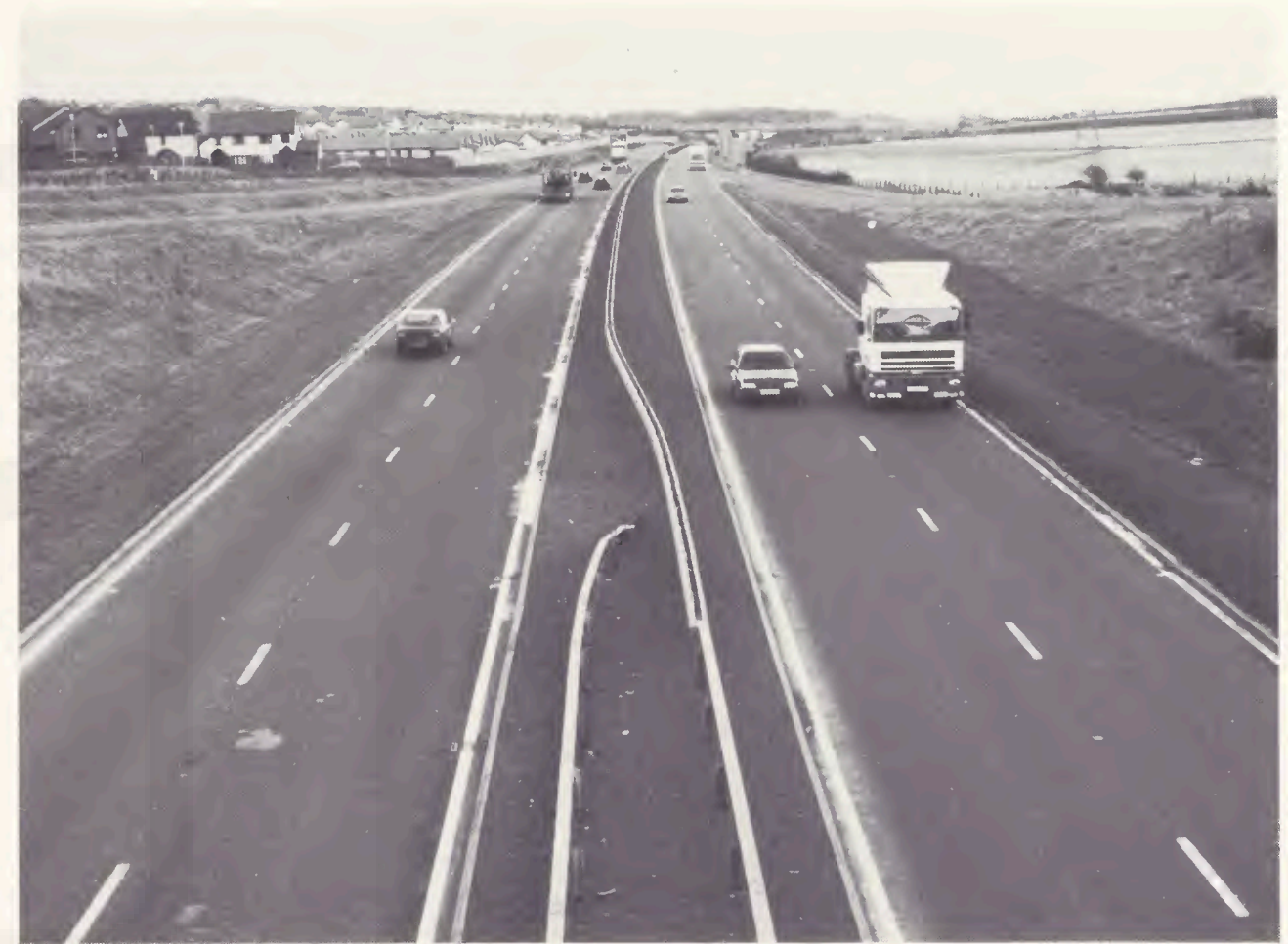
### Fairmilehead Junction

The opening of the Colinton Section prior to the completion of the Burdiehouse Section resulted in a significant change to the traffic pattern at this junction due to an increase in traffic turning from Frogston Road into Biggar Road.

These changes were accommodated by means of local improvements to the junction layout and the phasing of the traffic signals.

### Redford Road Junction

The Dreghorn Spur was constructed to give direct access to Redford Road. This new link is connected to Redford Road by means of a small roundabout.



Looking eastwards from Dreghorn Interchange

## STRUCTURES

### Water of Leith Bridge

The Bypass is carried over the Water of Leith on a 20 m high by 116 m long 3-span bridge of composite steel and concrete construction.

A feature of the steelwork for the bridge is the use of CORTEN grade steel which, because of its special composition, has the property of forming a protection coating of tightly-bonded oxide and requires no painting. Considerable savings accrue from the reduction in costs of providing access and painting.

### Overbridges

Overbridges carry Lanark Road, Torphin Road, Bonaly Road and Swanston Road over the Bypass without connection to it. The structures at the last three of these crossings are four-span continuous slab bridges with slender two-column piers of similar design to the Dreghorn Interchange Bridge.

The overbridge at Lanark Road is a three-span continuous slab also with two-column piers and spans a new access road serving a grain mill in the Water of Leith valley as well as the dual carriage-way.

### Other Structures

Other structures on this section are Woodhall Bridge, a plain slab bridge with textured concrete abutments, Bonaly Burn Bridge, a three-span continuous slab with fluted column piers, a box culvert underpass at Dreghorn on the private road to the Dreghorn Rifle Range and a concrete footbridge over the link road near Redford Road.

## LANDSCAPING AND ENVIRONMENTAL CONSIDERATIONS

To integrate the new road into the surrounding countryside a programme of planting was prepared and supervised by the Regional Council's landscape architect Turnbull Jeffrey Partnership.

As the new road passes close to residential areas at Wester Hailes, Woodhall Road, Bonaly and Swanston, earth mounds up to 6 metres high were formed to minimise the disturbance by traffic noise. These mounds were eventually planted with trees and shrubs to ensure that they blend into the countryside and reduce the visual intrusion of the new road when seen from its surroundings.



Water of Leith Bridge

## ADDITIONAL FEATURES

Since the completion of the Colinton Section in 1981 several additional features have been installed to enhance the safety of the new road for the motorist.

In 1987 six emergency laybys were added at intervals along this section of the Bypass. Each of

these is serviced by an emergency telephone system which was partially financed by the AA and the RAC.

A further improvement was the installation of the central reserve safety barrier. This work was undertaken in accordance with the recent policy of the DTP.

## CONSULTANTS AND CONTRACTORS

### Contractors:—

*Site Investigation*  
*Construction*

Whatlings (Foundations) Ltd  
Balfour Beatty Construction (Scotland) Ltd

### Main Sub-Contractors:—

*Earthworks*  
*Bituminous Surfacing*  
*Fencing*  
*Kerbing*  
*Seeding*  
*Structural Steelwork*  
*Rock Breaking*  
*Road Markings*

John Jones (Excavation) Ltd  
Wimpey Asphalt Ltd  
D E Fencing Ltd  
A F Murray  
D J E Seeding Services Ltd  
Fairfield-Mabey Ltd  
Daniel Bros. (Rock Drillers) Ltd  
Tim Doody

## ACKNOWLEDGEMENTS

The Regional Council would like to thank the following organisations for their co-operation during the design and construction of the Colinton Section of the City Bypass:—

British Gas	Edinburgh District Council
British Telecom	Scottish Development Department
South of Scotland Electricity Board	Transport and Road Research Laboratory — Livingston
Lothian and Borders Police	

— and all others who have in any way contributed to this project.



Lothian Regional Council

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# SIGHTHILL BYPASS 1986

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## INTRODUCTION

The arguments in favour of the provision of an outer bypass for Edinburgh, designed to a high standard, are so overwhelming that Lothian Regional Council is maintaining a continuing construction programme aimed at completion of the entire bypass by 1990.

Following a route which will be some 23 km (14 miles) in length, the City Bypass commences at Glasgow Road (A8) immediately west of the bridge over Edinburgh/Aberdeen railway and follows a generally south-easterly alignment terminating at its junction with the Musselburgh Bypass close to Old Craighall. The entire project, together with the Musselburgh and Portobello Bypasses, has an estimated overall cost of £126 million, a proportion of the City Bypass costs being met by Central Government.

The second of five sections of City Bypass to be constructed, the Sighthill Bypass forms a much-needed link between Glasgow Road and the northern end of the Colinton Bypass upon which construction work began in 1979. Completion of this latter 5½ km (3½ mile) section in 1981 gave considerable relief not only to the residents of the Colinton area, who, for some time, had been experiencing increasing traffic congestion in and around Colinton Village, but also to drivers attempting to avoid the city centre.

Construction of the Sighthill Bypass commenced in September 1984 and with work substantially complete by the end of 1986 it is being opened to traffic some nine months ahead of programme. Meanwhile, site work on the Burdiehouse Section is well advanced with that for the Millerhill and Gilmerton Sections due to start later in 1987.

## DESIGN AND CONSTRUCTION

This project has been conceived and designed by engineering staff in the Regional Council's Department of Highways with assistance being given by ScotRail and Messrs J B Schofield and Partners in the design and construction supervision of the two bridges carrying the Edinburgh/Carstairs railway over the Sighthill Bypass and associated roadworks and in the temporary diversion of this railway. These bridges were constructed by Messrs French Kier Ltd in advance of the main roadworks. British Waterways Board have advised on the construction of the Union Canal aqueduct which was designed by Messrs Scott, Wilson Kirkpatrick & Partners.

The actual work of constructing the Sighthill Bypass was undertaken by Messrs Balfour Beatty Construction (Scotland) Limited under the terms of a contract valued at just under £13 million and supervision of this work was provided by Department of Highways staff, the Director of Highways being the Engineer for the Works.

The new road is a dual 2-lane carriageway, 9.3 metres wide incorporating 1-metre-wide hard strips at each edge. A single 9.3-metre-wide carriageway realignment of the Edinburgh/Kilmarnock road (A71) has been provided with localised dualling where required at junctions west of the Bypass. From the Bypass east to the city limits, the A71 has been built as a dual carriageway, 7.3 metres wide.

## GEOLOGY AND GROUND CONDITIONS

The route is underlain by sedimentary rocks of the Lower Oil Shale Group of the Calciferous Sandstone Measures of the Carboniferous Series with igneous intrusions in places. Bedrock does not outcrop anywhere but is nonetheless in a highly weathered condition throughout the site.

Overlying the bedrock is a highly variable thickness (between 1 m and 20 m) of glacial and post-glacial deposits, most of which are heavily over-consolidated and commonly known as "boulder clay" or "lodgement till".

Over the northern section of the site, fluvioglacial silty sandy gravels are encountered, sometimes overlying the boulder clay and sometimes resting directly on bedrock. In turn, the gravels are themselves overlain by alluvial silty uniform sands around the junction with A8 and by lacustrine silty clay, peat and silt, associated with the former Gogar Loch, around the Gogar Burn and along South Gyle Broadway, and special measures had to be taken during the construction of embankments in these areas in order to avoid over-stressing the sub-strata and to accelerate the anticipated settlements.

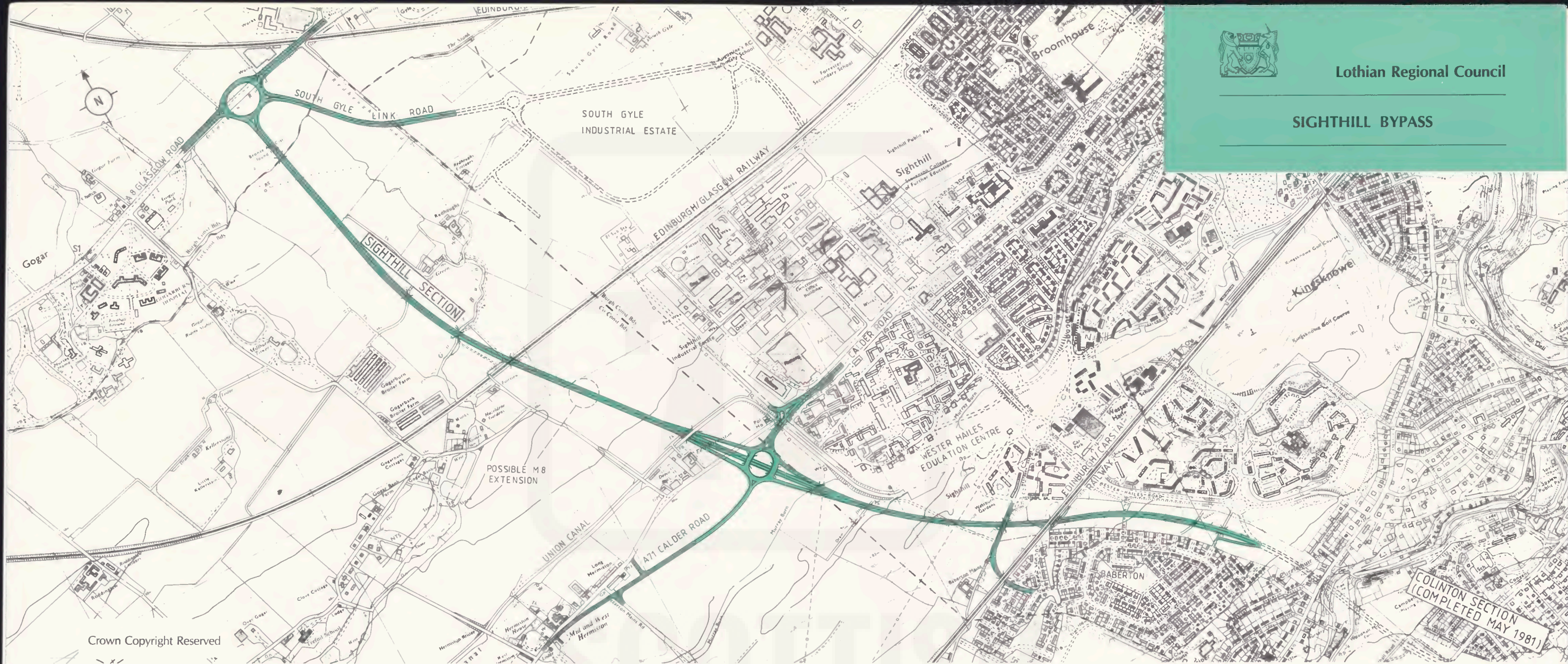
Isolated pockets of alluvium and fluvioglacial material were encountered in various small valleys along the route which had been formed as glacial melt-water channels.

*Glasgow Road Roundabout*





SIGHTHILL BYPASS



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COLINTON SECTION  
(COMPLETED MAY 1981)

**GENERAL ROUTE DESCRIPTION**

From its terminus at the new roundabout on Glasgow Road, the Sighthill Section follows a gently curving alignment in a southerly direction for some 4.7 km (3 miles) until it connects with the northern end of the Colinton Section close to Clovenstone Roundabout on Westerhailes Road.

The route lies predominantly within agricultural land of good quality apart from a section to the south of the Edinburgh/Carstairs main railway line where it is flanked by residential developments.

A total of 18 structures have been built enabling the new road to cross a variety of obstacles including two railway lines, a major road and a canal. In addition, ramps have been added to the existing footbridge over Glasgow Road at Gogarburn Hospital to help those in wheelchairs or with prams to cross this road safely.

In addition to the construction of the bypass, a new road linking the South Gyle Industrial Estate to A8 (Glasgow Road) has been provided as has a

diversion of a section of A71 (the Edinburgh to Kilmarnock road) which gives relief from fast-moving heavy traffic to Hermiston Village.

A short length of new road linking Westburn Avenue to Baberton Mains Hill has been built passing beneath the Edinburgh/Carstairs railway which itself was diverted temporarily to facilitate the construction of this bridge and a larger one carrying the railway over the new bypass.

**JUNCTIONS**

To provide access to and from the Bypass it was necessary to provide five junctions — these are briefly described thus:—

**Junctions with A8 Glasgow Road**

Extremely heavy traffic flows on Glasgow Road dictated that very special consideration had to be given to this junction situated at the extreme north end of the Sighthill Bypass. In addition the proximity of the flight-path for the second runway at Edinburgh Airport placed stringent height restrictions on the form of this junction leading to

the selection of a large surface-level roundabout. The asymmetric shape of the central island was necessitated as a result of the provision of a new dual-carriageway connection to South Gyle Industrial Estate.

**Junction with A71 Calder Road**

As with the Glasgow Road junction, the projected heavy traffic flows through this junction and also the requirement for traffic movement on to and off the bypass in both north and south directions pointed to the need for an intersection catering for all traffic movements. This was achieved using a grade-separated interchange with A71 traffic flowing through a new roundabout at ground level and the bypass traffic passing beneath in a cutting formed in very stiff boulder clay. Full slip-road provision gives multi-directional access.

**Baberton/Westburn Access**

From the north, the access to Baberton and Westburn/Westerhailes is adequately provided by the Calder Road interchange and local road network. Hence there was only a requirement for

access from the south and this has been provided by utilising the existing slip road from Clovenstone Roundabout on Westerhailes Road for traffic joining the bypass and travelling south and by forming a new connection into Baberton Mains View for northbound traffic leaving the bypass. This junction is intended for use by local traffic only and will be signed to local destinations, longer-distance traffic being directed to leave the bypass via the Calder Road interchange.

**A71 and Riccarton Mains Road**

The close proximity of this junction to that between A71 and the link to Hermiston Village and Gogar Station Road created a "staggered T" effect and due to the relatively high speed of traffic on the re-aligned A71 compared with the original flows through Hermiston Village, a section of this new A71 was widened locally and a central reserve created to form a short stretch of dual carriageway thus providing for safer turning movements within the junction.

### A71 and Cultins Road

Access to Cultins Road had previously been taken from the small roundabout immediately east of the Union Canal. With the extension westwards of the Calder Road dual carriageway, access to and from Cultins Road is now via the east-bound carriageway of Calder Road.

### Baberton/Westburn Link

The alignment of the bypass through the Baberton/Westburn areas required the permanent closure of Baberton Mains Terrace — thus the housing area at Baberton would have only one entry point. Clearly this was unacceptable both from an amenity point of view and for access by emergency services. Therefore a new link road was created joining Westburn Avenue to Baberton Mains Hill by passing beneath the Edinburgh/Carstairs railway line.

## STRUCTURES

As well as construction of the eighteen individual structures, temporary diversions of almost 800 metres of the Edinburgh/Carstairs railway line and 150 metres of the Union Canal were required.

### Edinburgh/Carstairs Railway

Diversion of the railway permitted the construction of two bridges, one with a steel deck, the other concrete, to allow the railway to pass over the bypass and the new Baberton/Westburn link road. This section of the project was undertaken in advance of the main roadworks contract.

### Union Canal Aqueduct

Continuing demand in Edinburgh for water from the Union Canal made it necessary for the new aqueduct, which would eventually carry the canal over the bypass at Hermiston, to be constructed without interruption to the flow in the canal and the contractor elected to use an open channel diversion capable of passing 237 litres per second. In addition an on-site back-up pumping arrangement with a similar throughput was required to be on permanent standby in order that continuity of water level was maintained on either side of the diversion. The four-span concrete structure is post-tensioned and is the second aqueduct to be built by Lothian Regional Council for this canal in recent years. The aqueduct was designed to British Waterways Board specification by Messrs Scott, Wilson, Kirkpatrick and Partners.

The overall length of the aqueduct is 94 metres and provides a navigable waterway 4 metres wide and 1.5 metres deep. Also included are 2-metre-wide walkways on either side of the canal cantilevered out from the main trough.

### Edinburgh/Glasgow Railway

Because of the density of traffic on this railway and its high operational speed most of the construction work had to be carried out during possessions of the track. These possessions were only available from midnight on Saturdays to 7.30 am on Sundays and thus much concentrated effort was required from the contractor during these periods.

Union Canal Aqueduct



A71 Interchange

Special precautions were taken to ensure the stability of the track during excavation for the foundations of the structure.

Reinforced concrete abutments support precast "U" section prestressed beams on individual rubber bearing pads over a clear span of 13.6 metres. A thin reinforced concrete slab over the beams provides support for the bituminous carriageway surfacing and an *in situ* concrete high-containment barrier protects the railway from errant vehicles.

### General Structures

Other major structures include two curved four-span *in situ* reinforced concrete bridges carrying A71 traffic across the bypass interchange, and a similar bridge (though straight) supporting Westburn Avenue at its crossing point.

Bridging Baberton Mains View is a single-span structure carrying the bypass and constructed using pre-cast beams on reinforced concrete abutments to support the deck. A similar arrangement was used to bridge the Union Canal at Calder Crescent where the re-aligned A71 crosses the canal.

Miscellaneous structures include 3 culverts for the Gogar and Murray Burns, one of which incorporates a bridleway, a farm accommodation bridge, an agricultural underpass, two footbridges and various retaining walls. In addition, ramps have been added to the existing footbridge at Gogarburn Hospital to facilitate its use by those with wheelchairs and prams.

## TUNNELLING

Diversions of existing deep foul sewers were undertaken using a combination of pipe-jacking and mini-tunnel techniques over a total length of 455 metres — the longest drive being 342 metres of 1-metre diameter mini-tunnel beneath both new and old A71 and the Union Canal.

Design work associated with the tunnelling operations was undertaken by the Regional Council's Department of Water and Drainage.

## ENVIRONMENTAL CONSIDERATIONS

To alleviate many of the problems often caused by the intrusion of new roads into the landscape, a major programme of planting is being undertaken to provide densely wooded areas, shrub groups, waterside planting and specimen tree groups. This work is being designed by the Regional Council's landscape consultants, the Turnbull-Jeffrey Partnership and carried out under a series of contracts aimed at completion by Spring 1988. Already the new roundabout on Glasgow Road is a striking example of the high standards being sought.

The interior of Hermiston Village, once torn apart by unremitting heavy traffic has now been bypassed by the realignment of A71 and this has provided an opportunity to improve the local environment immeasurably by the adoption of various hard and soft landscaping measures.

## PROJECT COSTS

Taking into account the effects of inflation, the estimated cost of the Sighthill Bypass is £20.4 million. This estimate includes items such as design charges, land acquisition, public utility diversions, advance bridgeworks construction, tunnelling, landscaping and planting, main roadworks, structures, road signs and accommodation works such as fencing, etc.

The scheme is part-financed by the Scottish Development Department.

## FACTS AND FIGURES

In under 2½ years, contractor Balfour Beatty Construction (Scotland) Limited who were awarded the £12.6 million roadworks contract have excavated approximately 40,000 cu m of rock and 500,000 cu m of soil, and have compacted 450,000 cu m of fill of which about

200,000 cu m was imported. Bridgeworks involved the fixing of some 1,300 tonnes of reinforcement and the pouring of 11,500 cu m of concrete. The temporary diversion of the Union Canal had to guarantee passage of 4½ million gallons of water a day with a similar standby pumping capacity, whilst the Edinburgh/Carstairs railway was temporarily diverted over a length of almost 800 metres. A total of over 12 km (nearly 8 miles) of fencing, 43 km (27 miles) of kerbing, 6 km (4 miles) of safety barriers, 27 km (17 miles) of drains and 17 hectares (42 acres) of asphalt surfacing have been provided.

Under separate landscaping contracts, some 2,500 trees, 200,000 forestry transplants and shrubs and 4 km (2½ miles) of hedging will ultimately be planted in a total of 24 hectares (60 acres) which will include 2½ hectares (1 acre) of formal tree and shrub planting.

## CONSULTANTS AND CONTRACTORS

### Contractors:

Main Roadworks Contractor	Balfour Beatty Construction (Scotland) Ltd
Advance Bridges Contractor	French-Kier Ltd
Landscaping Works (Contracts A & B)	Scottish Landscaping Ltd

### Main Sub-Contractors:

Bituminous Surfacing	Wimpey Asphalt Ltd
Tunnelling	John Mowlem & Co PLC
	Efor Ltd
	Barhale Construction Ltd
Structural Steelwork	D. A. D. Munro Ltd
Safety Fencing	Armstrong-Addison & Co Ltd
Bored Piling	Cementation Piling & Foundations Ltd
Seeding	Oldrob Ltd
Post-tensioning	VSL Systems Ltd
Fencing	G. A. Walker

### Consultants:

Advance Railway Bridges	J. B. Schofield & Partners
Union Canal Aqueduct	Scott, Wilson, Kirkpatrick & Partners
Landscaping	Turnbull-Jeffrey Partnership
Vibration Survey	Peter Fraenkel, Leslie & Reid
Geotechnical Certification	Babtie, Shaw & Morton

## ACKNOWLEDGEMENTS

The Regional Council would like to thank the following organisations for their co-operation during the design and construction of the Sighthill Section of the City By-pass:—

British Airports Authority	British Telecom
British Waterways Board	Lothians and Borders Police
Civil Aviation Authority	Edinburgh District Council
ScotRail	Scottish Development Department
South of Scotland Electricity Board	Heriot-Watt University
Scottish Gas	

and all others whose valued contributions have been received.



Lothian Regional Council

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# BURDIEHOUSE BYPASS 1988

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## INTRODUCTION

Lothian Regional Council continues to maintain its construction programme for the Edinburgh City Bypass, aiming for full completion by 1990. The Bypass, some 23 km (14 miles) in length, follows a generally easterly alignment between the Glasgow Road (A8) and the junction with the Musselburgh Bypass near Old Craighall. The entire project, including the Musselburgh and Portobello Bypasses, has an estimated overall cost of £126 million, with Central Government meeting a proportion of the City Bypass costs.

The third of five sections of the City Bypass to be completed, the Burdiehouse Bypass connects the eastern end of the Colinton Bypass at Biggar Road (A702) with Straiton Road (A701). Completion of this latest section should afford some relief to the residents of Fairmilehead who have been experiencing increasing traffic flows since the completion of the Colinton and Sighthill Bypasses in 1981 and 1986 respectively.

Construction of the Burdiehouse Bypass commenced in April 1986 and its substantial completion this summer will see more than half of the City Bypass open to traffic. Work on the Millerhill Section is now well advanced and the contract for the fifth and final Gilmerton Section was begun earlier this year.

## DESIGN AND CONSTRUCTION

The scheme has been designed and supervised by the Civil Engineering staff of the Regional Council's Department of Highways, the Director acting as Engineer for the Works. The construction work was carried out by Messrs Tractor Shovels Tawse Limited under the terms of a contract valued at over £8.6 million, made up of £6.3 million for the road construction, £1.5 million for major structures and £0.8 million for foul sewer and water main diversions.

The new road consists of dual 2-lane carriageways, 9.3 metres wide incorporating a 1-metre-wide hard strip at each carriageway edge. A short realignment of the Biggar Road (A702) has been provided with localised dualling over the Biggar Road bridge.

## GEOLOGY AND GROUND CONDITIONS

The route is divided almost in half by the Pentland Fault which crosses the site between the Lothian and Pentland Burns. West of the fault the route is underlain by volcanic lavas of the Old Red Sandstone succession with bedrock being close to the surface immediately east of Biggar Road. The major part of this section is overlain by boulder clay while in the low-lying area around the Pentland Fault the covering consists of alluvial deposits.

East of the fault the route is underlain by sediments of the Upper and Lower Oil Shale groups with the Burdiehouse Limestone beneath. Although the shales and limestone have been extensively worked to the east of Straiton Road there is no evidence of past workings in these materials beneath the route to the west of Straiton Road.

Eastwards from the alluvial deposits covering the low-lying ground in the centre the remainder of the route is overlain by glacial clays.

## GENERAL ROUTE DESCRIPTION

From its connection with the eastern end of the Colinton Section, the Burdiehouse Section follows an easterly alignment for some 3.1 km to its junction with Straiton Road between the settlements of Burdiehouse and Straiton.

The route is located predominantly through agricultural land, minimising land severance wherever possible, and is carried on embankment for most of its length in order to accommodate the Swanston, Lothian and Pentland Burns. Culverts have been built at these stream crossings together with two bridges and a retaining wall at the two major road junctions.

Under separate contracts, improvements have been carried out to Gilmerton Station Road and Lang Loan. These schemes improve access to and from the Straiton junction, at the same time relieving the communities of Gilmerton and Loanhead.



*Biggar Road Junction from the East*



Lothian Regional Council

**BURDIEHOUSE BYPASS**



## JUNCTIONS

### Biggar Road A702

Projected traffic flows through this junction together with those to and from the bypass indicated the need for a grade-separated interchange at this location, although the local topography and the layout of roads, properties and public utility services imposed constraints on the form of this junction. However, by utilising two small roundabouts and a single bridge over the bypass, land take has been kept to a minimum and the provision of a retaining wall to support the south-west slip road has avoided the need for property demolition.

### Straiton Road A701

As with the Biggar Road junction, the anticipated flows at this location showed the need for a two-level interchange catering for all traffic movements. The form of this junction was dictated by the positions of the electricity and gas sub-stations and the nearby junction with Loanhead Road B702. By adopting a layout similar to that at Biggar Road land take has again been kept to a minimum, with the bypass here crossing over instead of under the major road. The southern roundabout has been

positioned to accommodate Loanhead Road directly, thus avoiding the formation of a separate junction, while the northern roundabout incorporates the western end of the new Lang Loan realignment. A cycleway has been provided on the east side of the junction in order to maintain passage for cyclists between Lang Loan and Loanhead Road without the need to negotiate the two roundabouts. This popular route would otherwise have been severed by construction of the future Gilmerton Section of the City Bypass.

## STRUCTURES

Biggar Road Overbridge is a two-span structure of *in situ* reinforced concrete carrying both A702 traffic and public utility services, except water, over the bypass. It incorporates three short wing walls while the fourth, some 185 m long, retains the south-west slip road.

Straiton Road Underbridge, again of *in situ* reinforced concrete, is a curved four-span bridge allowing both A701 traffic and services to pass beneath the bypass.



Biggar Road Junction from the South



Straiton Road Junction from the South

The remaining structures comprise 4 culverts on the Swanston, Lothian and Pentland Burns and a mass concrete pipe bridge carrying the water main diversions over the Swanston Burn. The culverts consist of corrugated multiplate pipe arches with *in situ* reinforced concrete headwalls.

## SERVICE DIVERSIONS

In addition to the normal diversions of public utilities at the two interchanges, major diversions of foul sewers and water mains have been carried out at five locations along the route. In particular, the diversion of the 9", 350 mm, 30" and 33" mains east of Biggar Road, which together supply 55% of the city's daily water demand, represents the largest undertaking of this kind in the city for many years. In total, approximately 4180 metres of new mains and 34 valves have been installed under the contract. The design and supervision of this work was undertaken

by the Regional Council's Department of Water and Drainage.

## LANDSCAPING

In order to reduce the impact of the road on the existing environment a landscape design plan has been prepared by the Landscape Development Unit of the Regional Council's Department of Planning. With the route located predominantly in agricultural land the earthworks side-slopes have been rounded where possible, while at the junctions use has been made of natural setts and random masonry walling to link the rural and urban aspects of these locations.

The principal feature of the plan is the extensive planting of shrubs and trees throughout the route with varieties chosen to complement the indigenous species at the various locations. This programme of planting will be carried out under a separate contract beginning later this year.



**Client:—**

Lothian Regional Council  
George IV Bridge, Edinburgh

**Engineer for the Works:—**

P J Mason, MSc, CEng, FICE, FIHT,  
MCIT, DipTE  
Director of Highways  
19 Market Street, Edinburgh

**Contractors:—**

Site Investigation

Norwest Holst Soil Engineering Ltd

Construction

Tractor Shovels Tawse Ltd

**Main Sub-Contractors:—**

Concrete Structures, Foul Sewer &  
Water Main Diversions

M J Gleeson (Northern) Ltd

Bituminous Surfacing

Wimpey Asphalt Ltd

Rock Blasting

Rocklift Ltd

Corrugated Steel Structures

James Kemp Erection Services

Safety Fencing

James Strang Ltd

Fencing

Lothian Landscape Co

Seeding

Robert Lawrie & Sons

Kerbing

A F Murray

Walling & Paving

K Stewart

Sign Foundations

Signwork Contracts Ltd

Road Markings

G & B Roadmarkings

**Consultants:—**

Geotechnical Certification

Kirkpatrick Geotech

Vibration Survey

Peter Fraenkel, Leslie & Reid

**ACKNOWLEDGEMENTS**

The Regional Council would like to thank the following organisations for their co-operation during the design and construction of the Burdiehouse Section of the City Bypass:—

British Coal

Lothian and Borders Police

British Gas

Midlothian District Council

British Geological Survey

Scottish Development Department

British Telecom

South of Scotland Electricity Board

Edinburgh District Council

Transport and Road Research Laboratory,

Edinburgh University

Livingston

— and all others who have in any way contributed to this project.



Lothian Regional Council

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# MILLERHILL BYPASS 1988

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## INTRODUCTION

The provision of a Bypass for Edinburgh is a key element of Lothian Regional Council's transportation policy and the Council is continuing to maintain a construction programme aimed at completion of the entire project by 1990.

The Bypass which is approximately 23 kms (14 miles) in length follows a route round the south side of the City from the Glasgow Road (A8) west of the Maybury to the interchange on the Musselburgh Bypass near Old Craighall. The entire project including the Musselburgh and Portobello Bypasses has an estimated overall cost of £126 million, a proportion of which is being met by Central Government.

The Millerhill Bypass, which is the fourth of five sections of the City Bypass to be constructed, connects the A68 at Sheriffhall to the Musselburgh Bypass at the Old Craighall Interchange, a total length of 3.6 kilometres (2.2 miles).

Construction of the Millerhill Bypass commenced in June 1987 and its substantial completion by the end of 1988 is approximately 3 months ahead of programme. Meanwhile construction of the Gilmerton Section which is the fifth and final section of the City Bypass is now underway and on programme for completion by 1990.

## DESIGN AND CONSTRUCTION

The project has been designed by civil engineering staff in the Regional Council's Department of Highways with specialist advice being given by J W H Ross & Co Mining and Civil Engineers in the treatment of old mineworkings and the preparation of the advanced grouting contract. This contract was carried out by GKN Colcrete prior to the construction of the main roadworks.

Specialist assistance was also received from Reinforced Earth Co Ltd in the design of the reinforced earth rafts over the Sheriffhall and Newton faults.

The construction of the Millerhill Bypass was undertaken by Tractor Shovels Tawse Ltd under the terms of a contract valued at £6.9 million and supervised by the staff of the Department of Highways with the Director of Highways being the Engineer for the Works.

The new road is a 2 lane dual carriageway 9.3 metres wide including 1 metre wide hard strips on both sides of each carriageway. A single 7.9 metre wide carriageway has been provided between the B6415 and the Old Craighall interchange to cater for possible developments in the Musselburgh area.

## GEOLOGY AND GROUND CONDITIONS

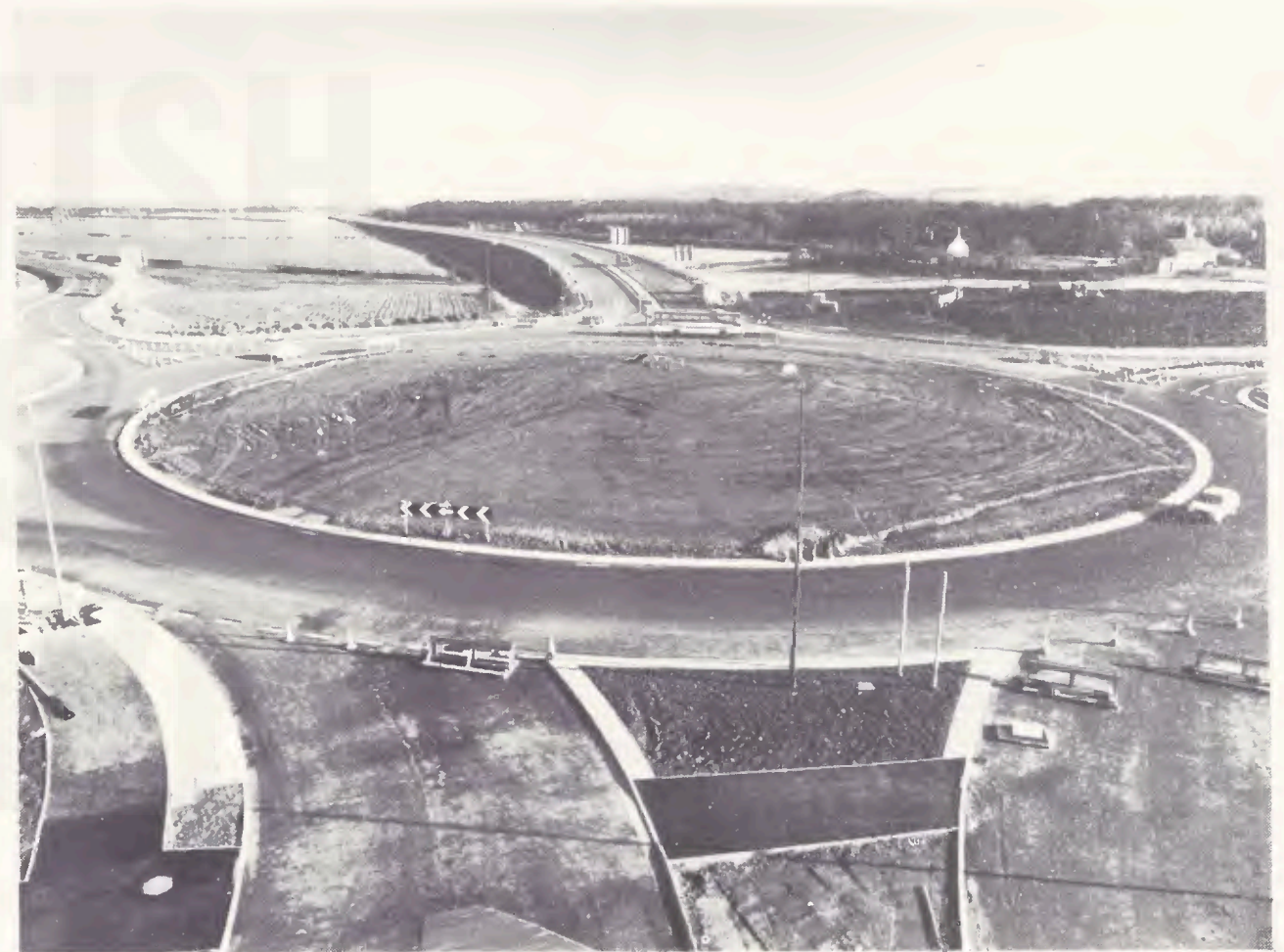
The route is underlain throughout by glacial clay with a localised covering of glacial and fluvio glacial sand and gravel. Over the northern section of the site there is a thin surface layer of granular raised beach material.

This drift material is underlain by a sedimentary strata containing coal seams which are known to have been extensively worked. The shallowest of these mine workings are in the 'Splint' coal below the site of the Monkton Lodge Bridge and these were stabilised in advance of the main roadworks contract by the injection of cement and fly ash grout. All of the other known workings below the new road are at a depth greater than 20m and are therefore not considered a risk to the New Works.

Areas where old records indicated the possibility of former mineshafts were fully investigated and a shaft was located to the east of the A6106. This mineshaft was consolidated by grouting.

The route crosses the line of the geological faults at Sheriffhall and Newton and provision was made for the possibility of future ground movement by the installation of reinforced earth rafts below the new carriageway.

*Sheriffhall Roundabout from the west (nearing completion)*





### GENERAL ROUTE DESCRIPTION


The Millerhill Bypass follows a gentle curve along a north to north easterly alignment, round the south side of Millerhill Village, from the new roundabout at Sheriffhall on the A68 to the interchange with the Musselburgh Bypass near Old Craighall Village.

The route which is across agricultural land of good quality was adopted to preserve intact the solid woodland edge of the Dalkeith Estate and to minimise land severance.

Two structures have been built, one of which maintains access to the Dalkeith Estate from Old Craighall Village and the other while giving access to the farmer also accommodates the re-aligned route of the Public Right of Way to Newton Church.

A short link between the Old Craighall Interchange and Old Craighall Road (B6415) has also been constructed to give direct access to the Musselburgh area.

The Millerhill Bypass will give direct access for traffic from the Musselburgh Bypass to the A68. Access to the completed sections of the City Bypass can then be obtained via Melville Gate and the improved Gilmerton Station Road and Lang Loan.



**Lothian Regional Council**

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**Edinburgh City Bypass  
(Millerhill Section)**

## JUNCTIONS

### Junction with A68 at Sheriffhall

Special consideration had to be given to the junction on the A68 because of a geological fault traversing the area and the possibility of coal extraction from Monktonhall and Bilston Glen Collieries.

This combination could result in significant settlement which could not be accommodated in the design of the structures required for a grade separated interchange and therefore a surface level roundabout had to be adopted.

The carriageway alignment at this location however allows for the construction of a grade separated intersection at a later date when the coal extraction has ceased.

The roundabout has been located directly above the fault so that any future ground movement will occur where traffic speeds are at their lowest and reinforced earth rafts have been installed below the carriageway where the roundabout crosses the fault to reduce the effects of any settlement until remedial works can be carried out.

The layout of the roundabout has been designed to accommodate the Gilmerton Section of the Edinburgh City Bypass and the A7 Dalkeith Bypass which is currently being designed by the Scottish Development Department.

### Old Craighall Junction with Musselburgh Bypass

The location and layout of the intersection with the Musselburgh Bypass which marks the eastern end of the Edinburgh City Bypass was adopted following consultation with the Scottish Development Department as trunk road authority.

The projected traffic flows indicated a requirement for multi-directional movements at this location and this has been achieved by the selection of a grade separated interchange with full slip road access to a new roundabout at ground level.

This junction was constructed as a joint project with the Scottish Development Department, the bridges and the slip road earthworks being constructed along with the Musselburgh Bypass, and the remainder being constructed as part of the Millerhill Bypass.

### Old Craighall Link Road

The layout of the Old Craighall Junction with a roundabout below the Musselburgh Bypass permitted the construction of a link road to the Old Craighall Road (B6415) which gives direct access from the Musselburgh and Edinburgh City Bypasses to future developments in the Musselburgh area.

This link road is connected to the Old Craighall Road by means of a small roundabout.



Monkton Lodge Access Overbridge with the Old Craighall Junction in the background



Bypass crossing of Newton Farm Underpass which maintains the Public Right of Way to Newton Church

## STRUCTURES

In addition to the major underbridges constructed by the Scottish Development Department at the Old Craighall Junction, 2 major bridges, 2 drainage culverts and 3 reinforced earth rafts were required which are briefly described as follows:—

### Monkton Lodge Overbridge

Access to the Dalkeith Estate from Old Craighall Village via Monkton Lodge Access has been maintained by the construction of a 4 span bridge over the Bypass and the re-alignment of the access road.

This structure consists of reinforced concrete piers and abutments supporting a composite reinforced concrete and structural steel deck.

All known shallow mineworkings below this structure were stabilised with the injection of cement and fly ash grout prior to construction. However consideration has been given in the design of the bridge for ground movement resulting from future deep mining.

### Newton Farm Underpass

The provision of a reinforced concrete underpass

immediately north of the Newton Church gives joint access to farm vehicles from Newton Farm and pedestrians using the re-aligned Public Right of Way to Newton Church.

This underpass has been designed to accommodate possible ground movement from future deep mining by the adoption of an articulated reinforced concrete structure consisting of linked modules.

### Reinforced Earth Rafts

Reinforced earth rafts consisting of galvanised steel straps and a selected frictional fill have been installed below the carriageway at the crossings of the geological faults at Sheriffhall and Newton to mitigate the effect of any future settlement.

These structures were designed by the Reinforced Earth Company and specialist advice was given during their construction.

### Drainage Culverts

Two concrete drainage culverts have been provided where the new roadworks cross existing watercourses. The largest of these is the culvert below the B6415 link road for the Craigie Burn.

## LANDSCAPING

To enhance the visual and environmental attractiveness of the new road and to integrate it into the surrounding countryside a programme of landscaping is being prepared by the Regional Councils' landscape consultant Prof. David N Skinner. This work will be carried out under 2 separate contracts aimed at completion by the end of 1989.

Creative land form shaping has been undertaken at the junctions where space is available and these will be planted with small blocks of trees and shrubs.

Dense tree planting will also be provided to the east of the Sheriffhall Roundabout to give the appearance of a continuity of the woodland at the Dalkeith Estate, and in the vicinity of the underpass to shield

pedestrians using the Public Right of Way from the impact of the new road.

The plants and trees adopted will include species which will be of value to wildlife in an area dominated by intensive agriculture.

## PROJECT COST

The overall cost of the Millerhill Bypass allowing for inflation is estimated at £11.2 million. This estimate includes design and site supervision fees, land acquisition, public utility diversions, road construction, ground stabilisation, landscaping and road signs.

The contract is part-financed by the Scottish Development Department and grant assistance has been received from the EEC.

## CONSULTANTS AND CONTRACTORS

### Contractors:—

*Site Investigation*

Wimpey Laboratories Ltd  
Whatlings (Foundations) Ltd

*Advanced Consolidation Works  
Construction*

GKN Colcrete Ltd  
Tractor Shovels Tawse Ltd

### Main Sub-Contractors:—

*Bridgeworks*

Sir Robert McAlpine & Sons Ltd

*Bituminous Surfacing*

Tarmac Roadstone  
Kings & Company Contracting Ltd

*Drainage*

John Meiklem, Drainage Contractors Ltd

*Safety Fencing*

G A Walker

*Fencing*

Lothian Landscape Co Ltd

*Soiling & Seeding*

Robert Lawrie & Sons Ltd

*Kerbing*

A F Murray

*Sign Foundations*

Signworks Contracts Ltd

*Road Markings*

Markon Ltd

### Consultants:—

*Treatment of Mineworkings*

J W H Ross & Co Mining & Civil Engineers

*Reinforced Earth Rafts*

Reinforced Earth Co Ltd

*Landscaping*

La Terre Armee Internationale

*Geotechnical Certification*

David N Skinner, Landscape Architect

*Structural Certification*

T A Civils, Civil & Foundation Engineers

Blyth & Blyth, Consulting Engineers

## ACKNOWLEDGEMENTS

The Regional Council would like to thank the following organisations for their co-operation during the design and construction of the Millerhill Section of the City Bypass:—

British Coal

Midlothian District Council

British Gas

East Lothian District Council

British Telecom

Scottish Development Department

South of Scotland Electricity Board

Transport and Road Research Laboratory — Livingston

Lothian and Borders Police

and all others who have in any way contributed to this project.



Lothian Regional Council

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# GILMERTON BYPASS 1989

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## INTRODUCTION

Since 1979, when construction work began on the Colinton Bypass, the provision of an outer city bypass for Edinburgh by 1990 has been a key element of Lothian Regional Council's transportation policy.

The Bypass which is approximately 23 kms (14 miles) in length follows a route round the south side of the City from the Glasgow Road (A8) west of the Maybury to the interchange on the Musselburgh Bypass (A1) near Old Craighall. The entire project including the Musselburgh and Portobello Bypasses had an estimated overall cost of £126 million, a proportion of which is being met by a Central Government Grant and a European Regional Development Fund Grant.

The Gilmerton Bypass is the fifth and final section to be completed and connects Straiton Road (A701) to Old Dalkeith Road (A68) at Sheriffhall — a distance of some 4.5 km (2.8 miles). This completes the link between the A8 and the A1 trunk roads.

Construction of the Gilmerton Bypass commenced in February 1988 and with work substantially complete by the end of 1989 it is being opened to traffic some eight months ahead of programme and within the target date of 1990 for the entire Bypass.



*Bypass looking west from Sheriffhall*

## DESIGN AND CONSTRUCTION

The Gilmerton Bypass has been designed by civil engineering staff in the Regional Council's Department of Highways with specialist advice being given by J W H Ross & Co, Consulting Mining and Civil Engineers, in the treatment of old mine-workings. Further assistance was given by T A Civils, Consulting Engineers, in the design of a heavy duty geotextile membrane and stabilisation of limestone workings at Straiton.

The construction of the Gilmerton Bypass was undertaken by Miller Construction Ltd under the terms of a contract valued at £11.6 million and supervised by the staff of the Department of Highways with the Director of Highways being the Engineer for the Works.

The new road is a 2 lane dual carriageway 9.3 metres wide with 1 metre hard strips on both sides of each carriageway. Both Lasswade Road and Gilmerton Road (A7) have been realigned at their junction with the Bypass with single 7.3 metre carriageways being provided.

## GEOLOGY AND GROUND CONDITIONS

The site is underlain entirely by sedimentary strata of the Lower and Upper Carboniferous age comprising alternating sequences of sandstone, siltstone, and claystones with occasional bands of limestone, coal and oil shale. The route also crosses the western limb of the basin forming the Midlothian Coalfield, and consequently the strata dips steeply eastwards in the west and at a shallower angle in the east. Due to this steepness at outcrop these coal seams are collectively referred to as the 'Edge Coals' and comprise about 24 workable beds of coal.

A detailed site investigation confirmed that the limestone and oil shales had been extensively worked to the east of Straiton Road and also identified a number of coal seams near Lasswade Road which had also been worked. Conventional grouting techniques using a mixture of sand, cement and fly ash were adopted to consolidate the coal workings and the Broxburn and Fells oil shales. At Straiton, however, a combination of the grout injection method and the placing of a heavy-duty geotextile membrane at rockhead level was

used to provide support to the road embankment over the limestone and Pentland oil shale workings. A total of seven mineshafts were located along the route and were either consolidated by grout injection or capped at rockhead.

Three areas of made ground were present on the line of the road, the most significant of these being the backfilled quarry area at Straiton which resulted from the extraction of the limestone by opencast methods to a maximum depth of 16 metres. The backfill in the quarry was varied, comprising areas of clay, weathered shale and domestic refuse and it was necessary to remove all of this material and replace it with suitable granular material.

A second area of made ground was present to the east of Langloan and was thought to be a backfilled clay borrow pit. The material consisted of loose black ash and claystone fragments with some sandstone and wood. A minimum of 2 metres of this unsuitable material was removed and replaced with suitable granular material.

The third area was a recently completed opencast coal site at Lasswade Road where mining to a depth of 20 metres had taken place. To avoid settlement problems at this location a surcharge embankment was constructed and monitored over a period of 8 months.

## GENERAL ROUTE DESCRIPTION

From the junction with the Burdiehouse Bypass at Straiton, the Gilmerton Bypass follows a gently curving alignment in an easterly direction to the Sheriffhall Roundabout where it connects with the Millerhill Bypass and the proposed A7 Dalkeith Bypass.

The route crosses through agricultural land minimising land severance where possible, and is carried on embankment from Straiton over the Mineral Railway and Lasswade Road. East of Lasswade Road the route is in cutting and passes beneath the realigned Gilmerton Road prior to its termination at Sheriffhall.

Three bridges have been constructed — at the mineral railway, Lasswade Road and Gilmerton Road and, in order to accommodate the Park Burn which crossed the route in several places, two culverts have been built.

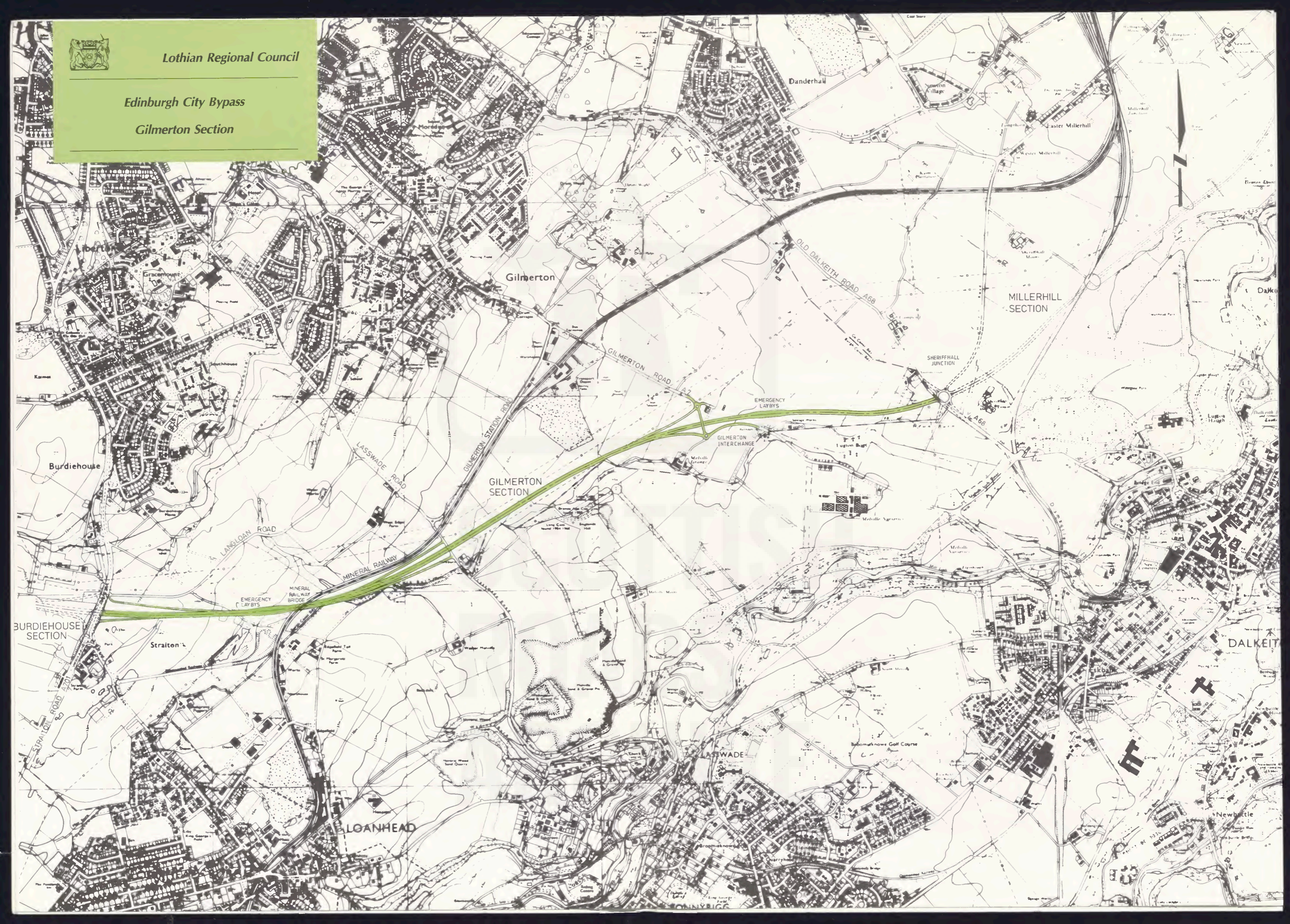




Lothian Regional Council

Edinburgh City Bypass

Gilmerton Section



## JUNCTIONS

### Straiton Road A701

This junction was constructed as part of the Burdiehouse Bypass but two slip roads have been added to the Gilmerton Bypass which will complete this two-level interchange and cater for all traffic movements.

### Lasswade Road

Projected traffic flow indicated that a partial grade separated junction would be required at this location providing access to and from the west. The two slip roads form T-junctions with Lasswade Road which has been realigned locally to improve visibility.

### Gilmerton Road A7

As with Lasswade Road, projected traffic flows indicated that only a partial grade separated junction was required at Gilmerton Road for traffic to and from the west. However, it was also necessary to provide access to Melville Grange Cottages and Melville Grange Farm. In order to minimise land take a layout has been adopted which utilises two small roundabouts with a connecting bridge crossing over the bypass to carry the realigned Gilmerton Road.



Gilmerton Road Bridge

A joint cycleway/footway has been provided on the eastern side of the junction with cross-over points on Gilmerton Road to the north and south of the junction. This will obviate the need for cyclists to negotiate the two roundabouts.

### Old Dalkeith Road A68

The Gilmerton Bypass terminates at Sheriffhall Roundabout on the A68. This roundabout was constructed as part of the Millerhill Bypass and has been designed to accommodate the proposed A7 Dalkeith Bypass.

## STRUCTURES

### Mineral Railway Bridge

The Bypass crosses the mineral railway line serving Bilston Glen Colliery at a large skew angle and the resulting underbridge is a single-span structure with precast concrete beams and *in situ* reinforced concrete deck supported by reinforced concrete abutments. A high containment concrete parapet is provided at road level to protect the railway line from vehicles in the event of a road accident.



Lasswade Road Bridge

### Lasswade Road Bridge

Lasswade Road Underbridge consists of an *in situ* reinforced concrete voided slab deck on reinforced concrete abutments. A number of coal seams are present in this area and the ground below the structure was consolidated by grout injection methods.

### Gilmerton Road Bridge

Gilmerton Road Overbridge is a two-span structure which carries the realigned Gilmerton Road over the bypass. It consists of a central reinforced concrete pier and bankseats supporting a composite structural steel and reinforced concrete deck. The structure is designed to accommodate possible ground movements from future deep mining.

### Drainage Culverts

Two concrete drainage culverts have been constructed to accommodate the Park Burn which crossed the line of the Bypass at a number of locations. The larger of the two culverts is a 500 metre long 1.65 metre diameter concrete pipe which runs parallel to the bypass between the mineral railway bridge and Lasswade Road. A smaller culvert, 30 metres in length, crosses beneath Lasswade Road.

## SERVICE DIVERSIONS

In addition to the normal diversion of public utility services in Lasswade Road and Gilmerton Road involving the Water and Drainage Department, SSEB and British Telecom, a major diversion of overhead power lines was carried out prior to the start of the roadworks contract. In total some 4,200 metres of 33,000 volt and 11,000 volt power lines were re-routed along the southern boundary of the bypass.

## LANDSCAPING

A landscape design plan has been prepared by the Landscape Development Unit of the Regional Council's Department of Planning. The plan fulfills two objectives:

- (1) To minimise the impact of the road when viewed from the surrounding countryside.
- (2) To create a pleasant landscape experience for the motorist travelling along the route.

The proposals include using surplus materials from excavations to help integrate new embankments and bridges with the surrounding landforms, and planting of almost 200,000 native trees and shrubs which will form significant areas of new woodland within the Green Belt. Extensive areas will also be sown with wild flowers. The landscape contract will be let separately and will commence early in 1990.

## PROJECT COST

The overall cost of the Gilmerton Bypass allowing for inflation is estimated at £17 million. This estimate includes design and site supervision fees, land acquisition, public utility diversions, ground

stabilisation, road and bridgeworks, road signs and landscaping.

The contract is part financed by a Central Government Grant and application has been made for a European Development Fund Grant.

## CONSULTANTS AND CONTRACTORS

### Contractors:—

*Site Investigation  
Construction*

Norwest Holst Soil Engineering Ltd  
Miller Construction Ltd

### Main Sub-Contractors:—

*Bituminous Surfacing  
Structural Steelwork  
Earthworks  
Drainage  
Safety Fencing  
Kerbing  
Fencing  
Masonry Walling  
Road Markings*

R M Douglas Ltd  
Lanarkshire Welding Co Ltd  
K P C Contracts Ltd  
Loudounhill Contracts Ltd  
C D Robertson  
Hunter & MacLean  
G A Walker  
D Smith  
Markon

### Consultants:—

*Treatment of Mineworkings  
Treatment of Limestone Workings  
Vibration & Noise Surveys  
Geotechnical Certification  
Structural Certification*

J W H Ross & Co Mining and Civil Engineers  
T A Civils  
Peter Fraenkel, Leslie & Reid  
T A Geotechnical  
Blyth & Blyth, Consulting Engineers

## ACKNOWLEDGEMENTS

The Regional Council would like to thank the following organisations for their co-operation during the design and construction of the Gilmerton Bypass:—

British Coal	Lothian and Borders Police
British Gas	Edinburgh District Council
British Telecom	Midlothian District Council
South of Scotland Electricity Board	Scottish Development Department
British Geological Survey	Transport and Road Research Laboratory, Livingston

— and all others who have in any way contributed to this project.



SCOTTISH  
ROADS  
ARCHIVE